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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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23735 7590 09/10/2010 DIGIMARC CORPORATION 9405 SW GEMINI DRIVE BEAVERTON, OR 97008				
EXAMINER KAU, STEVEN Y				
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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

**Office Action Summary****Application No.**

10/723,181

**Applicant(s)**

RODRIGUEZ ET AL.

**Examiner**

STEVEN KAU

**Art Unit**

2625

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on Pre-Appeal Conf. Decision: 7/7/2010.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-21 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-21 is/are rejected.
- 7) ☒ Claim(s) 15, 16, 20 and 21 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 26 November 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

## DETAILED ACTION

### ***Response to Pre-Appeal Conference Request***

1. Applicant's arguments, see Reasons For Request For Pre-Appeal Review, received 20 April 2009, with respect to the rejections of claims 1-21 under 35 U.S.C. § 102(e) and § 103(a) have been fully considered and persuasive. Therefore, the final rejection has been withdrawn. However, upon further consideration, new grounds of rejection are made in view of newly discovered prior art(s). Thus, **the prosecution on the merits is reopened.**

### ***Continuation in Part***

2. Applicant claims priority benefits to U.S. Provisional Application Numbers U.S. Provisional Application Nos. 60/430,014, filed Nov. 28, 2002, 60/440,593, filed Jan. 15, 2003, 60/466,926, filed Apr. 30, 2003 and 60/475,389, filed Jun. 2, 2003, which are hereby incorporated by reference. This patent application is also a continuation in part of Ser. No. 10/165,751, filed Jun. 6, 2002, which is a continuation of Ser. No. 09/074,034, filed May 6, 1998 (now U.S. Pat. No. 6,449,377. This patent application is also a continuation in part of Ser. No. 10/012,703, filed Dec. 7, 2001, which is a continuation of Ser. No. 09/433,104, filed Nov. 3, 1999. (now U.S. Pat. No. 6,636,615), which is a continuation in part of Ser. No. 09/234,780, filed Jan. 20, 1999 (now abandoned), which claims priority to 60/071,983, filed Jan. 20, 1998. This patent application is also a continuation in part of Ser. No. 09/898,901, filed Jul. 2, 2001.

[0005] This application is related to U.S. Pat. Nos. 6,332,031 and 6,449,377, U.S. application Ser. Nos. 09/938,870, filed Aug. 23, 2001, Ser. No. 09/731,456, filed Dec. 6, 2000, Ser. No. 10/052,895, filed Jan. 17, 2002, Ser. No. 09/840,016, filed Apr. 20, 2001, and International Application PCT/US02/20832, filed Jul. 1, 2002. The above patents and applications are hereby incorporated by reference.

### ***Claim Objections***

3. Claims 20 and 21 are objected to under 37 CFR 1.75 as being a substantial duplicate of claims 15 and 16. When two claims in an application are duplicates or else are so close in content that they both cover the same thing, despite a slight difference in wording, it is proper after allowing one claim to object to the other as being a substantial duplicate of the allowed claim. See MPEP § 706.03(k).

With respect to claims 15 and 20, are directed to an image processing apparatus.

The comparisons of these two claims are summarized below:

#	Claim 15	#	Claim 20
Pream	A method for creating an image to be printed on a printed object, the image being used to determine whether the printed image is a copy or an original, the method comprising:	Pream	A method for creating an image to be printed on a printed object, the image being used to determine whether the printed image is a copy or an original, the method comprising:
A	using a programmed computing device to embed a machine readable auxiliary signal in the image, wherein the auxiliary signal is embedded at embedding locations using a set	A	using a programmed computing device to embed a machine readable auxiliary signal in the image, wherein the auxiliary signal is embedded at embedding locations using a print structure

	of two or more print structures that change in response to a copy operation, the change causing a divergence or convergence of a characteristic of the print structures such that the machine readable signal becomes more or less detectable;		that changes in response to a copy operation, the change causing a divergence or convergence of a characteristic of the print structures such that the machine readable signal becomes more or less detectable;
B	using a programmed computing device to create a metric to detect the convergence or divergence from an image scanned of a suspect printed object to determine whether the suspect printed object is a copy or an original.	B	using a programmed computing device to create a metric to detect the convergence or divergence from an image scanned of a suspect printed object to determine whether the suspect printed object is a copy or an original.

Claims 16 and 21 are directed to a computer readable storage claim reciting features corresponding to claims 15 and 20, respectively. Therefore, claim 21 is objected to for the same reason of the objection to claim 20 discussed above.

### ***Double Patenting***

4. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969). A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or

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1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement. Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

Claims 17 and 18 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claim 31 of copending Application No. 10/836094. The conflicting claims are not identical because the copending application requires the additional step "first machine readable auxiliary signal and a second machine readable auxiliary signal is embedded in the image, wherein the first auxiliary signal is conveyed using a first color and the second auxiliary signal is conveyed using a second color, the first and second colors being represented differently in response to a copy operation," not required by claim 17 of the pending application. However, the conflicting claims are not patentably distinct from each other because:

- Claims 17 and 31 recite common subject matter;
- Whereby both claims 17 and 31 which recites the open ended transitional phrase "comprising", does not preclude the method as being performed by an apparatus, and
- Whereby the elements of claim 31 are fully anticipated by copending application claim 17, and anticipation is "the ultimate or epitome of obviousness" (In re Kalm, 154 USPQ 10 (CCPA 1967), also In re Dailey, 178 USPQ 293 (CCPA 1973) and In re Pearson, 181 USPQ 641 (CCPA 1974)).

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

Claim 17 of the pending Application	Claim 31 of 10/836094 Application
17. A method for analyzing an image of a printed object to determine whether the printed image is a copy or an original, the method comprising:	31. A method for analyzing an image of a printed object to determine whether the printed object is a copy or an original, the method comprising:
determining whether a machine readable auxiliary signal is embedded in the image, wherein the auxiliary signal is embedded at embedding locations using a print structure that changes in response to a copy operation, the change causing a divergence or convergence of a characteristic of the print structure such that the machine readable signal becomes	determining whether at least one of a first machine readable auxiliary signal and a second machine readable auxiliary signal is embedded in the image, wherein the first auxiliary signal is conveyed using a first color and the second auxiliary signal is conveyed using a second color, the first and second colors being represented differently in response to a copy operation,

more or less detectable, the print structure comprising a color that changes in response to a copy operation; and	the different representation providing a divergence or convergence of a characteristic of the colors such that the machine readable signals becomes more or less detectable, in which the first color comprises a first spot color and the second color comprises a second different spot color; and
based on evaluating the machine readable auxiliary signal, determining whether the printed object is a copy or an original.	based on evaluating the machine-readable auxiliary signals, determining whether the printed object is a copy or an original.

Claim 18 is rejected under a provisional obviousness-type double patenting because of its dependency to claim 17.

***Claim Rejections - 35 USC § 101***

5. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

6. Claims 14, 16, 19 and 21 are rejected under 35 U.S.C. §101 because the claimed inventions are directed to non-statutory subject matter. Claims 14, 16, 19 and 21 are directed to "a computer readable storage medium". The recent Office Gazette Notice (Volume 1351, February 23, 2010) regarding "computer readable storage medium", or "computer readable medium" (and other such variations) claims makes clear that the terms "computer-readable medium" and "machine-readable medium" are presumed to include ineligible transitory signals. In addition, the original disclosure is silent about preclusion of ineligible transitory signals.

The sections of the Office Notice, recites:

"The United States Patent and Trademark Office (USPTO) is obliged to give claims their broadest reasonable interpretation consistent with the specification during proceedings before the USPTO. See *In re Zletz*, 893 F.2d 319 (Fed. Cir. 1989) (during patent examination the pending claims must be interpreted as broadly as their terms reasonably allow). The broadest reasonable interpretation of a claim drawn to a computer readable medium (also called machine readable medium and other such variations) typically covers forms of non-transitory tangible media and transitory propagating signals per se in view of the ordinary and customary meaning of computer readable media, particularly when the specification is silent. See MPEP 2111.01."

"When the broadest reasonable interpretation of a claim covers a signal per se, the claim must be rejected under 35 U.S.C. § 101 as covering non-statutory subject matter. See *In re Nuijten*, 500 F.3d 1346, 1356-57 (Fed. Cir. 2007) (transitory embodiments are not directed to statutory subject matter) and Interim Examination Instructions for Evaluating Subject Matter Eligibility Under 35 U.S.C. § 101, Aug. 24, 2009; p. 2."

"..... A claim drawn to such a computer readable medium that covers both transitory and non-transitory embodiments may be amended to narrow the claim to cover only statutory embodiments to avoid a rejection under 35 U.S.C. § 101 by adding the limitation "non-transitory" to the claim. Cf. *Animals - Patentability*, 1077 Off. Gaz. Pat. Office 24 (April 21, 1987) (suggesting that applicants add the limitation "non-human" to a claim covering a multi-cellular organism to avoid a rejection under 35 U.S.C. § 101). ..."



A signal is a form of energy. Thus, a signal is not a machine, not a process, not a manufacturing and composition of matter. Therefore, the claimed subject matter, i.e. a "computer readable storage medium" in claims 14, 16, 19 and 21 is directed to a non-statutory subject matter. Thus, claims 14, 16, 19 and 21 are rejection under 35 U.S.C. §101. As indicated in the Office Gazette notice, the term "non-transitory" can be used in the claim to exclude ineligible signal embodiments and make the claim eligible under 101.

The Office Gazette notice can be found at  
<http://www.uspto.gov/web/offices/com/sol/og/2010/week08/TOC.htm#ref20>.

### ***Claim Rejections - 35 USC § 103***

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claims 1, 2, 7, 8 and 14-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Natarajan (US 6,611,599) in view of Sonoda et al (US 6,014,453).

Regarding claim 1.

Natarajan discloses a method for analyzing an image of a printed object to determine whether the printed image is a copy or an original, the method comprising:

using a programmed computing device (**i.e. applicable digital electronics including microprocessors and computers**) to determine whether a machine readable auxiliary signal (**i.e. watermark is inserted into a digital image, col 3, lines 53-63**) is embedded in the image (**referring to Figs 5-11, an example of detecting the presence of watermark, which is a machine readable signal, col 9, line 64 to col 10, line 42**), and based on evaluating the machine readable auxiliary signal, using a programmed computing device to determine whether the printed object is a copy or an original (**referring to Fig. 4, a suspect object is evaluated to determine whether it is derived from a watermarked object, col 8, line 47 to col 9, line 30**).

Natarajan does not explicitly disclose wherein the auxiliary signal is embedded at embedding locations using a set of two or more print structures that change in response to a copy operation, the change causing a divergence or convergence of a characteristic of the print structures such that the machine readable signal becomes more or less detectable.

In the same field of endeavor, Sonoda teaches wherein the auxiliary signal (**i.e. a pattern**) is embedded at embedding locations (**i.e. the pattern, a special mark used to distinguish a non-reproducible document is added to the document, col 2, lines 15-18**) using a set of two or more print structures (**i.e. print structures such as shapes, characters, positions of the structures as shown in Figs. 8, 11 and 16-20, and so on, col 14, lines 28-57 discloses a special example**) that change in response to a copy operation (**comparing the character pattern from a received image, i.e. read by a copy machine, with the reference pattern to see if it is different than the**

**reference pattern, i.e. the position of the mark, or pattern is shifted, or changed due to copying, or read by the copy machine; see col 15, lines 15-42, and detail of the original image is lost and only a rough shape can be discerned due to the change of density, col 10, lines 38-56), the change causing a divergence or convergence of a characteristic of the print structures such that the machine readable signal becomes more or less detectable (one of the invention scopes in the disclosure is to judge whether a document is a counterfeit attempt, col11, line 65 to col 12, line 8; thus, it is sure that the document read by the copy machine with pattern position shifted and blurry resolution is not an original document).**

Prior art Natarajan discloses a method and electronic digital devices, i.e. microprocessors and computers to evaluate the presences of watermarks and to determine whether a suspect object is derived from a watermarked object, i.e. an watermarked image of Fig. 6. Prior art Sonoda discloses a method and apparatuses, CPU of a copier machine to determine whether or not a document, i.e. a bank note, is an original document. Therefore, prior arts Natarajan and Sonoda are the same filed of endeavors and the teaching of Sonoda is combinable to Natarajan.

At the time of the invention, it would have been obvious to one of ordinary skill in the art to modify Natarajan reference to include teaching of "the auxiliary signal is embedded at embedding locations using a set of two or more print structures that change in response to a copy operation, the change causing a divergence or convergence of a characteristic of the print structures such that the machine readable signal becomes more or less detectable" taught by Sonoda reference to further enhance

the technique of determining whether a suspect object is an original object, in order to prevent fraudulent attempts.

The suggestion/motivation for doing so would have been to enhance the method of Natarajan more efficiently and accurately in determining whether a suspect object is an original (col 9, lines 20-25, Sonoda).

Therefore, it would have been obvious to one of ordinary skill in the art to combine the Natarajan and the Sonoda references in order to obtain the invention as specified in claim 1.

Regarding claim 2, of claim 1.

Natarajan does not explicitly disclose wherein the set of print structures include a first color and a second color that change differently in response to a copy operation.

Sonoda discloses wherein the set of print structures include a first color (**color components of the detected pattern**) and a second color (**color components of reference pattern**) that change differently in response to a copy operation (**referring to Figs. 7 and 15, RGB color components of the detected pattern are judged whether these data are matched with the referencing pattern, col 12, lines 52-65**).

At the time of the invention, it would have been obvious to one of ordinary skill in the art to modify Natarajan reference to include teaching of "the set of print structures include a first color and a second color that change differently in response to a copy operation" taught by Sonoda reference to further enhance the technique of determining whether a suspect object is an original object, in order to prevent counterfeit attempts.

The suggestion/motivation for doing so would have been to enhance the method of Natarajan more efficiently and accurately in determining whether a suspect object is an original (col 9, lines 20-25, Sonoda).

Therefore, it would have been obvious to one of ordinary skill in the art to combine the Natarajan and the Sonoda references in order to obtain the invention as specified in claim 2.

Regarding claim 7, in accordance with claim 1.

Natarajan does not disclose wherein the set of print structures include a first print structure having a first aliasing property and a second print structure having a second aliasing property; wherein the first print structure aliases differently than the second print structure.

In the same field of endeavor, Sonoda teaches wherein the set of print structures include a first print structure having a first aliasing property (**referring to Fig. 13A, the change of print structure, i.e. shifted position, col 15, lines 27-42**) and a second print structure having a second aliasing property (**i.e. change in color and density, col 22, lines 53-58**); wherein the first print structure aliases differently than the second print structure (**position shift of the pattern or mark of Fig. 13A and changing color and density of a print structure are two different aliasing properties**).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have modified Natarajan to include wherein the set of print structures include a first print structure having a first aliasing property and a second

print structure having a second aliasing property; wherein the first print structure aliases differently than the second print structure as taught by Sonoda. The motivation for doing so would have been to improve the effectiveness in detecting whether or not an image is an original image; and further it is easily implemented by one or other in the art with a predictable result.

Regarding claim 8, in accordance with claim 1.

Natarajan discloses wherein the auxiliary signal (**i.e. watermark**) is embedded (**i.e. watermark is inserted into a digital object, i.e. an image of Fig. 6, col 3, lines 53-55, and col 9, line 67 to col 10, line 1**).

Natarajan does not explicitly disclose wherein the auxiliary signal is embedded by varying continuity of line structures.

Sonoda discloses wherein the auxiliary signal (**i.e. patterns added to an image discussed above**) is embedded by varying continuity of line structures (**referring to Figs. 8, 11 and 13, etc., the auxiliary signal, or pattern can be different shapes, i.e. angular or circular, or characters, col 14, lines 28-45 and col 15, lines 27-43**).

At the time of the invention, it would have been obvious to one of ordinary skill in the art to modify Natarajan reference to include teaching of "the auxiliary signal is embedded by varying continuity of line structures" taught by Sonoda reference to further improve the watermark structure to be more complex to prevent any fraudulent attempt.

The suggestion/motivation for doing so would have been to enhance the method of Natarajan to improve the watermark structure to be more complex to further prevent any fraudulent attempt.

Therefore, it would have been obvious to one of ordinary skill in the art to combine the Natarajan and the Sonoda references in order to obtain the invention as specified in claim 8.

Regarding claim 14.

Claim 14 is directed to a computer readable storage medium claim which substantially corresponds to operation of the steps in claim 1, with processing steps directly corresponding to the step functions in claim 1. Thus, claim 14 is rejected as set forth above for claim 1.

Regarding claim 15.

Natarajan discloses a method for creating an image to be printed on a printed object (**referring to Fig. 6, a watermarked image, col 9, line 67 to col 10, line 1**), the image being used to determine whether the printed image is a copy or an original (**a suspect object is evaluated to determine whether it is derived from a watermarked object, col 8, line 47 to col 9, line 30**), the method comprising: using a programmed computing device (**i.e. applicable digital electronics including microprocessors and computers**) to embed a machine readable auxiliary signal (**i.e. a watermark**) in the image (**a watermark is incorporated into a digital object, or an**

**image, col 3, lines 55-63**); and using a programmed computing device to create a metric (**i.e. steps of the method of Fig. 4, col 8, lines 47-67**) to detect the convergence or divergence from an image scanned of a suspect printed object to determine whether the suspect printed object is a copy or an original (**a suspect object is evaluated to determine whether it is derived from a watermarked object, col 8, line 47 to col 9, line 30**).

Natarajan does not explicitly disclose wherein the auxiliary signal is embedded at embedding locations using a set of two or more print structures that change in response to a copy operation, the change causing a divergence or convergence of a characteristic of the print structures such that the machine readable signal becomes more or less detectable.

In the same field of endeavor, Sonoda teaches wherein the auxiliary signal (**i.e. a pattern**) is embedded at embedding locations (**i.e. the pattern, a special mark used to distinguish a non-reproducible document is added to the document, col 2, lines 15-18**) using a set of two or more print structures (**i.e. print structures such as shapes, characters, positions of the structures as shown in Figs. 8, 11 and 16-20, and so on, col 14, lines 28-57 discloses a special example**) that change in response to a copy operation (**comparing the character pattern from a received image, i.e. read by a copy machine, with the reference pattern to see if it is different than the reference pattern, i.e. the position of the mark, or pattern is shifted, or changed due to copying, or read by the copy machine; see col 15, lines 15-42, and detail of the original image is lost and only a rough shape can be discerned due to the**



**change of density, col 10, lines 38-56), the change causing a divergence or convergence of a characteristic of the print structures such that the machine readable signal becomes more or less detectable (one of the invention scopes in the disclosure is to judge whether a document is a counterfeit attempt, col11, line 65 to col 12, line 8; thus, it is sure that the document read by the copy machine with pattern position shifted and blurry resolution is not an original document).**

Prior art Natarajan discloses a method and electronic digital devices, i.e. microprocessors and computers to evaluate the presences of watermarks and to determine whether a suspect object is derived from a watermarked object, i.e. an watermarked image of Fig. 6. Prior art Sonoda discloses a method and apparatuses, CPU of a copier machine to determine whether or not a document, i.e. a bank note, is an original document. Therefore, prior arts Natarajan and Sonoda are the same filed of endeavors and the teaching of Sonoda is combinable to Natarajan.

At the time of the invention, it would have been obvious to one of ordinary skill in the art to modify Natarajan reference to include teaching of "the auxiliary signal is embedded at embedding locations using a set of two or more print structures that change in response to a copy operation, the change causing a divergence or convergence of a characteristic of the print structures such that the machine readable signal becomes more or less detectable" taught by Sonoda reference to further enhance the technique of determining whether a suspect object is an original object, in order to prevent any fraudulent attempt.

The suggestion/motivation for doing so would have been to enhance the method of Natarajan more efficiently and accurately in determining whether a suspect object is an original (col 9, lines 20-25, Sonoda).

Therefore, it would have been obvious to one of ordinary skill in the art to combine the Natarajan and the Sonoda references in order to obtain the invention as specified in claim 15.

Regarding claim 16.

Claim 16 is directed to a computer readable storage medium claim which substantially corresponds to operation of the steps in claim 15, with processing steps directly corresponding to the step functions in claim 15. Thus, claim 16 is rejected as set forth above for claim 15.

Regarding claim 17.

Natarajan discloses a method for analyzing an image of a printed object to determine whether the printed image is a copy or an original, the method comprising: using a programmed computing device (**i.e. applicable digital electronics including microprocessors and computers**) to determine whether a machine readable auxiliary signal (**i.e. watermark is inserted into a digital image, col 3, lines 53-63**) is embedded in the image (**referring to Figs 5-11, an example of detecting the presence of watermark, which is a machine readable signal, col 9, line 64 to col 10, line 42**), and based on evaluating the machine readable auxiliary signal, using a programmed computing device to determine whether the printed object is a copy or an

original (**referring to Fig. 4, a suspect object is evaluated to determine whether it is derived from a watermarked object, col 8, line 47 to col 9, line 30**).

Natarajan does not explicitly disclose wherein the auxiliary signal is embedded at embedding locations using a print structure that changes in response to a copy operation, the change causing a divergence or convergence of a characteristic of the print structures such that the machine readable signal becomes more or less detectable, the print structure comprising a color that changes in response to a copy operation.

In the same field of endeavor, Sonoda teaches wherein the auxiliary signal (i.e. a **pattern**) is embedded at embedding locations (i.e. **the pattern, a special mark used to distinguish a non-reproducible document is added to the document, col 2, lines 15-18**) using a print structure (i.e. **print structures such as shapes, characters, positions as shown in Figs. 8, 11 and 16-20, and so on, col 14, lines 28-57 discloses a special example**) that change in response to a copy operation (comparing the character pattern from a received image, i.e. read by a copy machine, with the reference pattern to see if it is different than the reference pattern, i.e. the position of the mark, or pattern is shifted, or changed due to copying, or read by the copy machine; see col 15, lines 15-42, and detail of the original image is lost and only a rough shape can be discerned due to the change of density, col 10, lines 38-56), the change causing a divergence or convergence of a characteristic of the print structures such that the machine readable signal becomes more or less detectable (one of **the invention scopes in the disclosure is to judge**

**whether a document is a counterfeit attempt, col11, line 65 to col 12, line 8; thus, it is sure that the document read by the copy machine with pattern position shifted and blurry resolution is not an original document), the print structure comprising a color that changes in response to a copy operation (referring to Fig. 1, actual image data are full color data, col 8, lines 33-41, and color and density are changed when the document image is read by a copy machine, col 22, lines 53-58).**

Prior art Natarajan discloses a method and electronic digital devices, i.e. microprocessors and computers to evaluate the presences of watermarks and to determine whether a suspect object is derived from a watermarked object, i.e. an watermarked image of Fig. 6. Prior art Sonoda discloses a method and apparatuses, CPU of a copier machine to determine whether or not a document, i.e. a bank note, is an original document. Therefore, prior arts Natarajan and Sonoda are the same filed of endeavors and the teaching of Sonoda is combinable to Natarajan.

At the time of the invention, it would have been obvious to one of ordinary skill in the art to modify Natarajan reference to include teaching of "the auxiliary signal is embedded at embedding locations using a set of two or more print structures that change in response to a copy operation, the change causing a divergence or convergence of a characteristic of the print structures such that the machine readable signal becomes more or less detectable and the print structure comprising a color that changes in response to a copy operation" taught by Sonoda reference to further

enhance the technique of determining whether a suspect object is an original object, in order to prevent any fraudulent attempt.

The suggestion/motivation for doing so would have been to enhance the method of Natarajan more efficiently and accurately in determining whether a suspect object is an original (col 9, lines 20-25, Sonoda).

Therefore, it would have been obvious to one of ordinary skill in the art to combine the Natarajan and the Sonoda references in order to obtain the invention as specified in claim 17.

Regarding claim 18, of claim 17.

Claim 18 recites identical features as claim 8. Thus, arguments similar to that presented above for claim 8 are also equally applicable to claim 18.

Regarding claim 19.

Claim 19 is directed to a computer-readable storage medium claim which substantially corresponds to operation of the steps in claim 17, with processing steps directly corresponding to the step functions in claim 17. Thus, claim 19 is rejected as set forth above for claim 17.

Regarding claim 20.

Claim 20 recites identical features as claim 15. Thus, arguments similar to that presented above for claim 15 are also equally applicable to claim 20.

Regarding claim 21.

Claim Y is directed to a computer readable storage medium claim which substantially corresponds to step operation of the method in claim 20, with processing instruction directly corresponding to the step function of method in claim 20. Thus, claim 21 is rejected as set forth above for claim 20.

9. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Natarajan (US 6,611,599) in view of Sonoda et al (US 6,014,453) as applied to claim 2 above, and in view of Tavernier et al (US 5,824,447).

Regarding claim 3, in accordance with claim 2.

Natarajan in view of Sonoda does not disclose wherein at least one of the colors corresponds to an ink color that is out of gamut of a printer or scanner.

In the same field of endeavor, Tavernier teaches wherein at least one of the colors corresponds to an ink color that is out of gamut of a printer or scanner (i.e. **“It is possible to introduce pigments having a color laying outside of the color gamut printable by normal photocopiers in such a way that photocopying of the document is impossible”**, col 8, lines 16-19).

Prior art Tavernier discloses a method and apparatus for security printing to prevent fraudulent use of the original documents such bank cards, driver license, etc. Therefore, prior art Tavernier, Natarajan and Sonoda are the same field of endeavor. The teaching of Tavernier reference is combinable to Natarajan and Sonoda references.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have modified the combination of Natarajan in view of Sonoda to include wherein at least one of the colors corresponds to an ink color that is out of gamut of a printer or scanner as taught by Tavernier. The motivation for doing so would have been to enhance document security protection and to more effectively identify whether or not a printed copy is an original; and further it is easily implemented by one or other in the art with a predictable result.

10. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Natarajan (US 6,611,599) in view of Sonoda et al (US 6,014,453) as applied to claim 2 above, and in view of Kimura et al (US 6,434,322).

Regarding claim 4, in accordance with claim 2.

Natarajan in view of Sonoda does not disclose wherein a difference in luminance of the two colors changes in response to a copy operation.

Kimura teaches wherein a difference in luminance of the two colors changes in response to a copy operation (**i.e. luminance value is changed in the reproduction method, col 2, lines 51-67 and col 7, lines 14-21**).

Prior art Kimura discloses a method and apparatus for copy control with watermark detection, and change of watermark luminance when it is copied. Therefore, prior art Kimura, Natarajan and Sonoda are the same field of endeavor, and the teaching of Kimura is combinable to Natarajan and Sonoda,

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have modified the combination of Natarajan in view of Sonoda to include wherein a difference in luminance of the two colors changes in response to a copy operation as taught by Kimura. The motivation for doing so would have been to enhance document security protection and to prevent fraudulent attempts; and further it is easily implemented by one or other in the art with a predictable result.

11. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Natarajan (US 6,611,599) in view of Sonoda et al (US 6,014,453) as applied to claim 1 above, and in view of Ostromoukhov et al (US 6,198,545).

Regarding claim 5, in accordance with claim 1.

Natarajan in view of Sonoda does not disclose wherein the set of print structures include a first print structure having a first dot gain property and a second print structure having a second dot gain property; wherein the first print structure is more susceptible to dot gain than the second print structure in response to a copy operation.

Ostromoukhov teaches wherein the set of print structures include a first print structure having a first dot gain property and a second print structure having a second dot gain property (i.e. **variations of the halftoning period are useful to prevent non authorized copies of images produced in this manner; this is due to the fact that small screen dots and large screen dots are subjected to a different dot gain during reproduction, col 9, lines 5-26**); wherein the first print structure is more susceptible to dot gain than the second print structure in response to a copy operation



**(i.e. referring Figs. 20 & 21, two different print structure gives different result and one is more susceptible than the other; col 9, lines 5-26).**

Prior art Ostromoukhov discloses a method and apparatus for synthesizing, displaying and printing color or black/white halftone image with subscreen dot shape variations to avoid counterfeiting. Thus prior art Ostromoukhov and Natarajan and Sonoda are the same field of endeavor.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have modified the combination of Natarajan in view of Sonoda to include wherein a difference in luminance of the two colors changes in response to a copy operation as taught by Ostromoukhov. The motivation for doing so would have been to enhance document security protection and to prevent counterfeiting; and further it is easily implemented by one or other in the art with a predictable result.

12. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Natarajan (US 6,611,599) in view of Sonoda et al (US 6,014,453) as applied to claim 1 above, and in view of Coonan et al (US 5,687,297).

Regarding claim 6, in accordance with claim 1.

Natarajan in view of Sonoda does not disclose wherein a difference in luminance of the print structures changes in response to a copy operation due to a difference in susceptibility to dot gain of the print structures.

Coonan teaches wherein a difference in luminance of the print structures changes in response to a copy operation due to a difference in susceptibility to dot gain

of the print structures (i.e. **applying augment compact dot grow mode to detect an edge or brightness transition between a target and any of its adjacent relative of the neighboring pixels; that is, a difference in luminance of the print structures changes in response to a copy operation due to a difference in susceptibility to dot gain of the print structures; col 10, lines 28-56).**

Prior art Coonan discloses a method and apparatus for dot growth control and bit-map tuning for image reproduction. However, as discussed above, the technique of dot growth control can be used to prevent non-authorized copies of images being produced (see Ostromoukhov et al, US 6,198,545). Thus, the teaching of Coonan reference is combinable to prior art Natarajan in view of Sonoda.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have modified the combination of Natarajan in view of Sonoda to include wherein a difference in luminance of the print structures changes in response to a copy operation due to a difference in susceptibility to dot gain of the print structures as taught by Coonan. The motivation for doing so would have been to enhance document security protection and to prevent counterfeiting in image reproduction; and further it is easily implemented by one or other in the art with a predictable result.

13. Claims 9 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Natarajan (US 6,611,599) in view of Sonoda et al (US 6,014,453) as applied to claim 8 above, and further in view of Castagnoli (US 5,074,596).

Regarding claim 9, in accordance with claim 8.

Natarajan in view of Sonoda does not disclose wherein one print structure comprises a line segment in a first color, and another print structure comprises a line segment in another color.

Castagnoli teaches wherein one print structure comprises a line segment in a first color, and another print structure comprises a line segment in another color (i.e. **referring to Figs. 1-9, line segments with different color designs; col 3, lines 12-18 and col 4, lines 18-61**).

Prior art Castagnoli discloses method in designing a safety document for anti-counterfeit with different color in different line segments. Therefore, prior art Castagnoli, Natarajan and Sonoda are the same field of endeavor. The teaching of Castagnoli is combinable with Natarajan and Sonoda.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have modified the combination of Natarajan in view of Sonoda to include wherein one print structure comprises a line segment in a first color, and another print structure comprises a line segment in another color as taught by Castagnoli. The motivation for doing so would have been to enhance document security protection to anti-counterfeiting; and further it is easily implemented by one or other in the art with a predictable result.

Regarding claim 10, in accordance with claim 9.

Natarajan in view of Sonoda does not disclose wherein the line segments of the different colors are arranged by varying between the first and second colors along a printed line.

Castagnoli teaches wherein the line segments of the different colors are arranged by varying between the first and second colors along a printed line (i.e. **referring to Figs. 5 and 5a, line segments have alternately different colors, Abstract, and col 4, lines 40-61).**

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have modified the combination of Natarajan in view of Sonoda to include wherein the line segments of the different colors are arranged by varying between the first and second colors along a printed line as taught by Castagnoli. The motivation for doing so would have been to improve document security protection and to enhancing the method of Natarajan to avoid fraudulence and counterfeit; and further it is easily implemented by one or other in the art with a predictable result.

14. Claims 11, 12 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Natarajan (US 6,611,599) in view of Sonoda et al (US 6,014,453) as applied to claim 1 above, and in view of Umeda (US 7,027,189).

Regarding claim 11, in accordance with claim 1.

Natarajan in view of Sonoda does not disclose wherein the evaluating includes evaluating a frequency domain metric to detect changes in the print structures.

Umeda teaches wherein the evaluating includes evaluating a frequency domain metric to detect changes in the print structures (i.e. **increase of power in low-frequency domain degrades the image quality and therefore a counterfeit is detected, col 4, line 28 to col 5, line 41 and Fig. 10**).

Prior art Umeda discloses a method and apparatus for image processing of embedding a different kind of information in an image for anti-counterfeiting. Prior art Umeda, Natarajan and Sonoda are the same field of endeavor and therefore, the teaching of Umeda is combinable to Natarajan in view of Sonoda.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have modified the combination of Natarajan in view of Sonoda to include wherein the evaluating includes evaluating a frequency domain metric to detect changes in the print structures as taught by Umeda. The motivation for doing so would have been to enhance document security protection and to prevent forgery; and further it is easily implemented by one or other in the art with a predictable result.

Regarding claim 12, in accordance with claim 11.

Natarajan in view of Sonoda does not disclose wherein the frequency domain metric is a radial frequency domain metric.

In the same field of endeavor, Umeda teaches wherein the frequency domain metric is a radial frequency domain metric (**referring to Figs. 8A-C, and 9A-C, which disclose radial frequency domain, col 4, lines 39-64**).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have modified the combination of Natarajan in view of Sonoda to

include wherein the frequency domain metric is a radial frequency domain metric as taught by Umeda. The motivation for doing so would have been to enhance frequency domain detection by evaluating the power distribution and to detect whether a printed copy is a copy or an original; and further it is easily implemented by one or other in the art with a predictable result.

Regarding claim 13, in accordance with claim 1.

Natarajan in view of Sonoda does not disclose wherein the frequency domain metric is used to evaluate changes in color of a print structure.

Umeda teaches wherein the frequency domain metric is used to evaluate changes in color of a print structure **(i.e. referring to Fig. 10, evaluating power spectrum of color component for dot-pattern, col 5, lines 13-41).**

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to have modified the combination of Natarajan in view of Sonoda to include wherein the frequency domain metric is used to evaluate changes in color of a print structure as taught by Umeda. The motivation for doing so would have been to enhance frequency domain detection by evaluating the power spectrum of a color component and to detect whether a printed copy is a copy or an original; and further it is easily implemented by one or other in the art with a predictable result.

***Contact Information***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Steven Kau whose telephone number is 571-270-1120 and fax number is 571-270-2120. The examiner can normally be reached on M-F, 8:30am-5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Moore can be reached on 571-272-7437. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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/Steven Kau/  
Examiner, Art Unit 2625  
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